



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/728,734

12/05/2003

Ring-Ling Chien

100/12330

1715

21569 7590 09/18/2007
CALIPER LIFE SCIENCES, INC.
605 FAIRCHILD DRIVE
MOUNTAIN VIEW, CA 94043-2234

EXAMINER

VATHYAM, SUREKHA

ART UNIT

PAPER NUMBER

1753

MAIL DATE

DELIVERY MODE

09/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/728,734

Applicant(s)

CHIEN ET AL.

Examiner

Surekha Vathyam

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 June 2007 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: Page 2, second full paragraph, first line, of amendments to the specification filed on 25 June 2007, incorrectly replaces paragraph 0033 on page 9, instead it should state - -Please replace paragraph 0032 on page 9 with the following rewritten paragraph:- -.

Appropriate correction is required.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "402a" (page 19, paragraph [0060], line 11).

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "738" and "740" in Fig. 7.

4. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being

Art Unit: 1753

amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

Art Unit: 1753

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1, 3 – 11, 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 2002/0008029 issued as US 6,818,113) in view of Lin et al. (US 6,699,384) and Parce et al. (US 5,869,004). NOTE: The column and line numbers of US 6,818,113 are indicated throughout this office action for Williams et al. for ease of identification of relevant sections as opposed to the published application US 2002/0008029.

Relevant to claim 1, Williams ('113) discloses a method comprising the provision of a device (Figure 1) comprising at least first, second, and third channels (26, 28, and 30) that intersect with and are fluidly coupled to a fourth channel (16), wherein said first channel intersects said fourth channel at an opposite side of and at a channel region (32) that is located between the intersection of the second (34) and third (36) channels with the fourth channel; loading a sample material (column 8, lines 33 – 45) comprising at least a first species in a low conductivity buffer (column 11, lines 5 – 19) into the first channel; directing the sample material into the second and third channels via the fourth channel (column 8, lines 33 – 45) while concomitantly loading the high conductivity buffer from opposite ends of the fourth channel into the second and a third channels

Art Unit: 1753

(column 8, line 33 – column 9, line 11 and column 11, lines 5 – 38) so that the low conductivity buffer of the sample material forms at least two fluid interfaces with the high conductivity buffer (Figure 1); and applying an electric field along a length of the fourth channel to concentrate at least said first species at at least one of said two fluid interfaces (column 10, lines 10 – 32).

Relevant to claim 3, Williams ('113) also discloses the concentration of species being increased by their method (column 10, lines 15 – 32).

Relevant to claims 4 and 11, Williams ('113) also discloses the sample material comprising a plurality of different materials (column 7, lines 23 – 39 and column 10, lines 15 – 32).

Relevant to claim 5, Williams ('113) also discloses at least first and second species being electrophoretically separated in the fourth column (column 10, lines 15 – 32 and column 11, lines 39 – 57).

Relevant to claim 9, Williams ('113) discloses a sample species comprising nucleic acids (column 7, lines 23 – 39).

Relevant to claim 10, Williams ('113) discloses a sample species comprising polypeptides (column 7, lines 23 – 39; broadly recited, proteins are polypeptides).

Relevant to claim 16, Williams ('113) discloses electrokinetically loading the high conductivity buffer from opposite ends of the fourth channel into the second and third channels (column 8, lines 46 – 56).

Relevant to claim 18 Williams ('113) discloses said first and second species are oppositely charged and wherein said first species is concentrated at one of said two

Art Unit: 1753

fluidic interfaces and said second species is concentrated at the other one of said two fluidic interfaces during said applying step (column 10, lines 15 – 32).

Williams ('113) discloses loading a sample material (column 8, lines 33 – 45) comprising at least a first species in a low conductivity buffer (column 11, lines 5 – 19) into the first channel. Williams ('113) does not explicitly disclose the first channel includes a serpentine reaction channel into which a first and a second reactant are hydrodynamically loaded to form a sample.

Lin ('384) teaches a method providing a device comprising a serpentine channel region (15); providing a first reactant and a second reactant (column 4, lines 22 – 27); hydrodynamically loading said first and second reactants into the channel (column 4, lines 21 – 48 and column 7, line 62 – column 8, line 2); controlling the residence time of the first and second reactants within the reaction channel region to form a sample material comprising at least a first species (column 7, line 62 – column 8, line 2 and column 5, lines 7 – 11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the first channel (26) of Williams ('113) to a serpentine channel and hydrodynamically load a first and second reactant in the channel to form a sample as taught by Lin ('384) because as Lin ('384) explains, it facilitates the initial mixing of the reactants and allows time for the reactions to occur between the reactants to form a product in a controlled manner (column 7, line 62 – column 8, line 2).

Williams ('113) does not explicitly disclose the specific enhancement of detection of a material using the method (Claims 1, 3, 5). Furthermore Williams ('113) does not

explicitly disclose: a second species being transported to a location other than a detection region (Claim 6), sample species that are specifically described as positively or negatively charged (Claims 7 and 8).

Parce ('004) explicitly discloses the enhanced detection of a material through a similar stacking method (column 15, lines 62-67). Relevant to claim 6, Parce ('004) also discloses a species from within the sample being transported to an area other than a detection region of the device (Figure 5E, Column 15, lines 54-59). Relevant to claims 7 and 8, Parce ('004) also discloses the use of either positively or negatively charged sample species (Column 15, lines 44-53).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Williams ('113) to use the stacking method for enhancement of detection of dilute materials, as taught by Parce ('004), because such stacking procedures provide convenient means of in situ sample concentration, allowing for analysis immediately following concentration as explained by Parce ('004) (column 13, lines 44 – 49).

Addressing claim 6, it would also have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Williams ('113) by transporting a second species within the sample material to a location other than a detection region of the device, as taught by Parce ('004), because it could remove potentially interfering material from the subsequent steps of analysis.

Addressing claims 7 and 8, it would also have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of

Art Unit: 1753

Williams ('113) by specifically analyzing either positively or negatively charged sample species, as taught by Parce ('004), because the stacking method is effective in either case.

9. Claims 12 – 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 2002/0008029 issued as US 6,818,113) in view of Lin et al. (US 6,699,384) and Parce et al. (US 5,869,004) as applied to claim 1 above, and further in view of Williams et al. (US 2002/0079223 issued as US 6,685,813).

NOTE: The column and line numbers of US 6,685,813 are indicated throughout this office action for Williams et al. for ease of identification of relevant sections as opposed to the published application US 2002/0079223.

Relevant to claims 12 – 15, Williams ('113) in view of Lin ('384) and Parce ('004) does not explicitly disclose the extent of concentration of sample species upon injection.

Williams ('813) discloses application of an electric field of sufficient magnitude and duration for over 100-fold concentration relevant to claims 12 – 15 (column 9, lines 18 – 38).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Williams ('113) in view of Lin ('384) and Parce ('004) by applying an electric field of sufficient magnitude and duration to

concentrate a species within the sample at least 100-fold, as taught by Williams ('813), because it would facilitate detection of dilute sample components.

Relevant to claim 17, Williams ('113) in view of Lin ('384) and Parce ('004) does not explicitly disclose the hydrodynamic loading of the high conductivity buffer.

Williams ('813) discloses the hydrodynamic loading of material (Figures 3A - 3D; column 8, line 62 – column 9, line 17).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Williams ('113) in view of Lin ('384) and Parce ('004) by loading the high conductivity buffer hydrodynamically as taught by Williams ('813), because it would eliminate concern of electrophoretic bias and resulting non-representative sampling of the analyte(s).

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 6,818,113) in view of Lin et al. (US 6,699,384) and Parce et al. (US 5,869,004) as applied to claim 1 above, and further in view of Kopf-Sill (US 6,001,231).

Relevant to claim 2, Williams ('113) in view of Lin ('384) and Parce ('004) does not explicitly disclose the use of the method to analyze an antibody/antigen mixture.

Kopf-Sill ('231) discloses the electrophoretic analysis of an antibody/antigen mixture in a microfluidic system (Column 14, line 28 - Column 15, line 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Williams ('113) in view of Lin ('384) Parce ('004) by using the method to analyze antibody/antigen mixtures, as taught by Kopf-Sill ('231), because it would allow enhanced detection of dilute antibody/antigen mixtures. Kopf-Sill ('231) also suggests broad applicability of known methods within the invention (Column 8, lines 32-55), and refers to control of concentrating procedures in the specification (Column 9, lines 25-29).

Response to Arguments

11. Applicant's arguments with respect to claims 1 – 18 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Singh et al. (US 2002/0058329), Parce et al. (US 2001/0027918), Chow et al. (US 2002/0019059), Ramsey (US 6,010,607) each disclose devices comprising serpentine channels with reactions occurring.

Art Unit: 1753

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Surekha Vathyam whose telephone number is 571-272-2682. The examiner can normally be reached on 7:30 AM to 4:00 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SV/

10 September 2007



NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700